



THE POTHOLE REPORT

An Update on Bay Area Pavement Conditions
March 2000



METROPOLITAN
TRANSPORTATION
COMMISSION

Cover photo by George Draper

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An Update on Bay Area Pavement Conditions

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Bridge and Highway Operations Section**

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**METROPOLITAN
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Executive Summary

IN 1981, THE METROPOLITAN TRANSPORTATION Commission (MTC) — the transportation planning, financing and coordinating agency for the nine-county San Francisco Bay Area — conducted a study that estimated that the region's local streets and roads had a deferred maintenance price tag of \$400 million — or the equivalent of approximately \$750 million in 1999 dollars. Today, the deferred maintenance bill is a staggering \$1.6 billion.

The 1981 study revealed that many jurisdictions were responding to a funding crunch by postponing pavement maintenance and repair, thereby allowing their roadway systems to deteriorate at an alarming rate. This update confirms that — despite considerable efforts by MTC and many cities and counties described later in this report — the deferred maintenance crisis has more than doubled in size since 1981.

THE MAGNITUDE OF THE PROBLEM

- If funding remains at current levels, the price tag for pavement maintenance and repair can be expected to rise to more than \$1.8 billion by fiscal year 2002-03.
- Projected over the next 20 years, the shortfall in funding for the Bay Area's local streets and roads will total \$5.6 billion, with \$2.3 billion of this amount directly attributable to pavement upkeep and repair.
- Cities and counties — which are responsible for 91 percent of all road mileage in the Bay Area — are able to spend an average of only \$13,000 per mile annually on pavement maintenance, far less than the nearly \$20,000 per mile necessary to keep roads in good condition.

WAYS TO CUT THE SHORTFALL DOWN TO SIZE

Increase funding:

County sales tax initiatives

MTC is supporting a constitutional amendment that would allow a simple majority approval of local transportation taxes. Such taxes could help fund pavement maintenance.

Regional gas tax

State legislation successfully sponsored by MTC in 1997 authorizes MTC to seek voter approval on up to a 10-cent-per-gallon tax on gasoline sold in Bay Area counties to fund a series of transportation improvements, including streets and roads. A “Pennies for Potholes” campaign could help make a difference.

Commitment of existing funds

MTC has pledged to direct over 80 percent of transportation funds toward Bay Area maintenance projects over the next 20 years, both for roads and for public transit.

State efforts

MTC supported state gas tax increases in 1982 and 1989 that began to address the problem. The 1999-2000 session of the state Legislature is considering bonds, general fund contributions and other mechanisms to increase investment in the transportation infrastructure. MTC is urging the Legislature to consider the needs of local jurisdictions when putting together any such program: Long-term, predictable funding is a must if cities and counties are to make serious strides toward a pothole-free future.

Improve cost-effectiveness:

MTC's Pavement Management System (PMS)

In response to the 1981 study, MTC launched its pavement management system — a computer-assisted decision-making process designed to help cities and counties prevent pavement problems through judicious maintenance, and to diagnose and repair those that exist in a timely, cost-effective manner.

MTC's PMS helps local governments make the best use of available funds by giving them a tool for rating their streets' pavement condition, establishing a maintenance and repair schedule, and estimating how much money should be spent to upgrade their road network. Today, 94 cities and counties in the Bay Area and nearly 200 nationwide are using MTC's program.

MTC's Pavement Management Technical Assistance Program (P-TAP)

For smaller jurisdictions with limited resources, MTC recently established a technical assistance program that provides the services of pre-qualified consultants to help cities and counties establish and maintain a pavement management system.

P-TAP also allows MTC to gather more reliable pavement maintenance data, thus ensuring better estimates of regional needs and funding shortfalls. This will translate into more equitable distribution of existing funds and better informed advocacy for new revenues for the upkeep of local streets and roads.

MTC's Guide to the Legal Aspects of Trench Cuts

This 28-page guide is intended to help cities and counties regulate pavement excavation by utilities placing cables and pipes, and

coordinate such excavation with street paving schedules, thus minimizing the damage to roadways and lengthening the life of pavements.

CONCLUSION

Numerous studies have shown that if streets and roads are properly maintained, the total cost for maintenance is roughly 20 percent of the expenditure that would be required if the pavement were allowed to fail before repairing. A timely infusion of funding would ensure that the huge investment already made in the region's roadway network would not go to waste but would be protected and enhanced.

Introduction

“Of U.S. roads, 59 percent are in poor to fair condition, whereas one third of its bridges are deficient or obsolete. The deterioration and overuse are costing Americans nearly \$24 billion (\$132 per motorist) annually in extra vehicle repairs, wasted fuel, and wasted time, not to mention the increased vehicle emissions spurred by congested traffic. Moreover, road conditions are a factor in an estimated 30 percent of traffic fatalities.”

“A Call to Pay the U.S. Infrastructure Price Tag,” Edward G. Rendell, Public Works Management and Policy, vol. 3, no. 2, pp. 99–103, October 1998.

YOU’RE DRIVING ALONG A CITY STREET OR county road when, without warning, your vehicle hits a slew of potholes with a jolt that loosens the fillings in your teeth and an ominous clang that signals serious damage to your car.

This scenario is an all-too-common one in the Bay Area, and one not likely to vanish any time soon. The reasons for this situation are many, but the solutions can be boiled down to two: an infusion of dollars and an application of “sense,” i.e., a systematic approach to prevention and repair of road damage.

THE COSTS OF NEGLECT

In 1981, MTC conducted a study that estimated that the region’s 17,000 miles of local streets and roads had a deferred maintenance price tag of \$400 million — or the equivalent of approximately \$750 million in 1999 dollars.

The study traced the problem to rising costs and declining revenues, and revealed that many jurisdictions were

responding to a funding crunch by postponing pavement maintenance and repair, thereby allowing their roadway systems to deteriorate at an alarming rate.



George Draper

THE PAVEMENT PICTURE TODAY

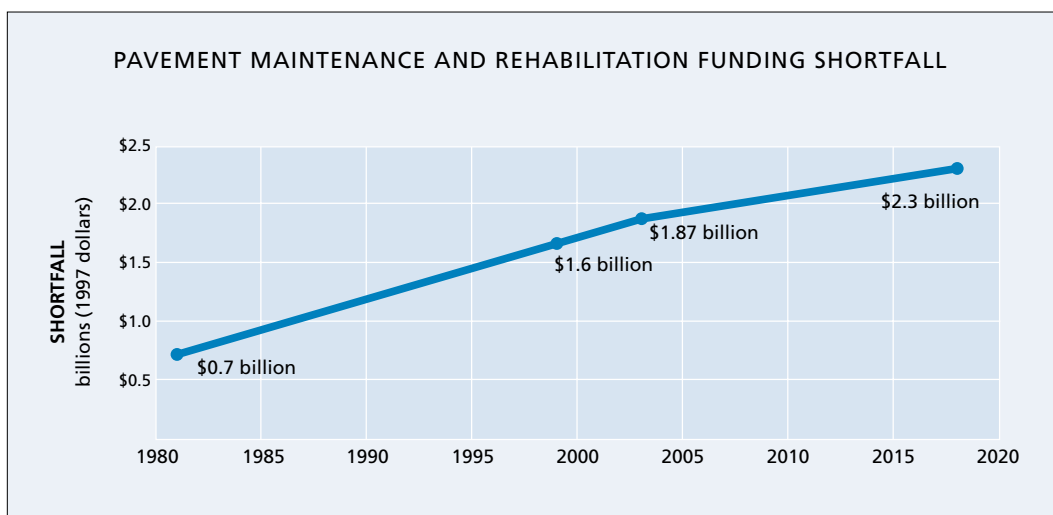
Almost two decades later, where do things stand? While local street and road mileage has increased by 2,000 miles (or about 11 percent), the cost of deferred maintenance has more than doubled since 1981 — it's now a whopping \$1.6 billion (in 1997 dollars). Moreover, if funding remains at current levels, the price tag for the deferred pavement maintenance backlog can be expected to rise to more than \$1.8 billion by fiscal year 2002-03 (see figure below). Obviously, the region's pavements are in dire need of help.

HOW DID THIS SITUATION COME ABOUT?

Although, over the years, the dollars dedicated to local street and road repair have increased, they have not kept pace with the accelerated pavement deterioration resulting from increases in the region's traffic volumes and especially heavy rainy seasons.

Contributing to this problem is the typical approach to pavement maintenance and repair taken by cities and counties:

- “Fix the worst first” is the usual — and least effective — strategy employed.
- Pavement repair is not considered a “front burner” policy item by most jurisdictions, and as a result, is often deferred.
- Many jurisdictions lack a consistent strategy to best decide how to spend the limited funds available for pavement maintenance.



Prevention and Repair

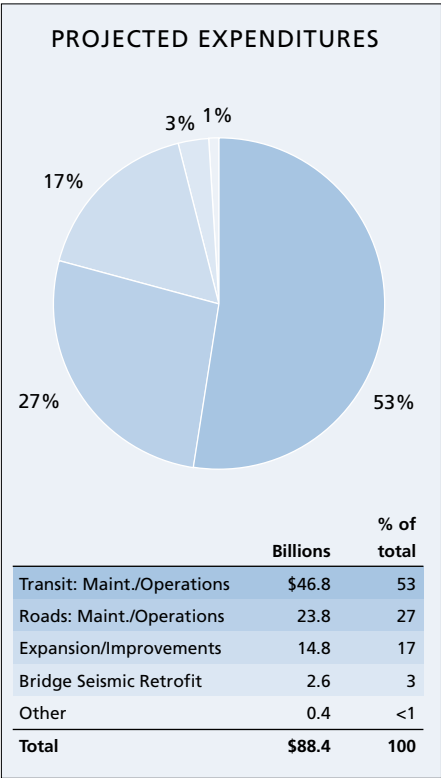
RX FOR ROADS

In response to the 1981 study, MTC launched its Pavement Management System (PMS) — a computer-assisted decision-making process designed to help cities and counties prevent pavement problems through judicious maintenance, and to diagnose and repair those that exist in a timely, cost-effective manner. MTC also advocated for additional funding for local road repair, and supported state gas tax increases in 1982 and 1989 that began to address the “dollar” side of the problem.

County sales taxes, which play a critical role in transportation finance in California, could be another source of pavement funds. In fact, between 1984 and 2012, some \$18.5 billion in revenues will have been generated by the sales tax measures now in effect, \$6.2 billion of which is committed to roadway expansion and repair projects. Depending on such taxes, however, can be problematic, since most of these taxes are temporary, and future sales taxes must be approved by a two-thirds “supermajority,” making their passage extremely difficult. MTC is supporting a constitutional amendment that would provide for a simple majority approval of local and regional transportation taxes.

MTC’s support for roadway repairs also is reflected in its transportation planning agenda, which takes a “fix it first” approach. The 1998 Regional Transportation Plan (RTP) adopted by

the Commission last October devotes 82 percent of all available transportation funding over the next 20 years to maintaining and operating — rather than expanding — the Bay Area’s freeways, local streets, and public transit system (see figure below). Despite this hefty commitment, however, the RTP projects that a \$5.6 billion shortfall in funding for



local streets and roads projects will remain, with \$2.3 billion of this amount directly attributable to pavement upkeep and repair.

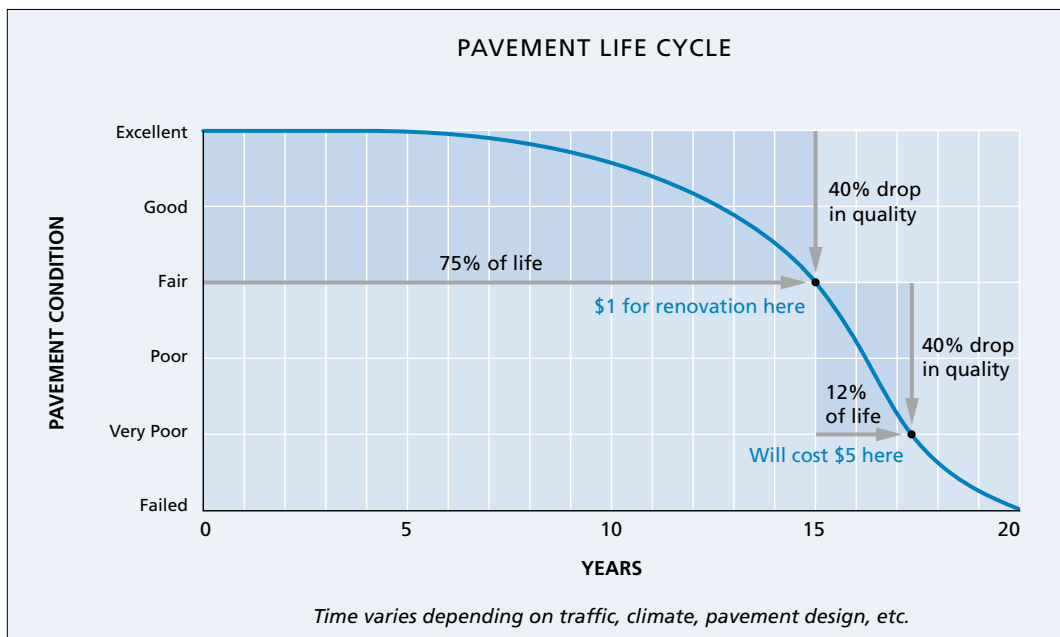
EARLY INTERVENTION IS KEY

A critical concept in street and road maintenance is that, while pavements deteriorate only 40 percent in quality in the first 75 percent of their life, this deterioration subsequently accelerates rapidly, resulting in another 40 percent drop in quality in the next 12 percent of life. A pavement management system can identify pavements that are headed toward such a precipitous decline, so that preventive maintenance can be applied in a timely fashion. These fixes cost, on average, about 20 percent of the expenditure that is required once a pavement has deteriorated in quality by 80 percent (see figure below).

THE ANATOMY OF A POTHOLE

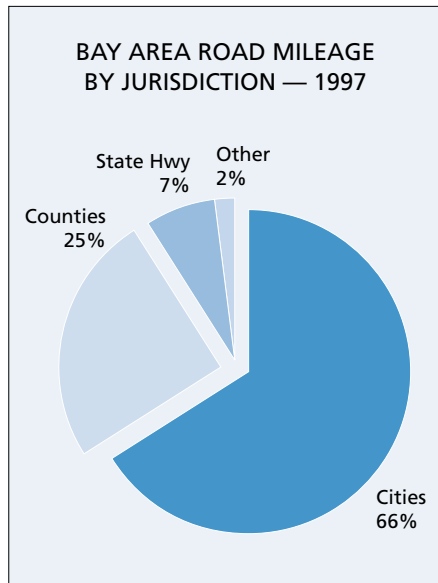
Streets and roads take quite a beating under the weight of traffic and the vagaries of weather. In time, cracks appear on the pavement surface. As the pavement's subbase is weakened by water leaking through the crack, the aging pavement is further damaged. At a certain critical point, the pavement begins to lose its ability to resist water and carry weight, and seems suddenly to fall apart.

Just like a car whose owner does not routinely change the oil and check the transmission fluid, a crack in the road not taken care of in a timely fashion gets worse and results in a bigger problem that is more expensive to repair.



NUMBERS TELL THE STORY

Pavement condition is measured by an index (PCI) ranging from 0 for roadways in the poorest condition, to 100 for the best maintained networks. Using this yardstick, the benefits of applying a pavement management system can easily be documented; for example, the average PCI of Bay Area jurisdictions that are active MTC PMS users improved from 58 in 1995 to 62 in 1997. Furthermore, the number of active MTC PMS users with good pavement condition (PCI 55 or higher) increased from 61 percent in 1995 to 81 percent in 1997. (For more detailed information about the pavement management system, see page 10.)



LOCAL JURISDICTIONS OWN MOST ROADS

The state's 1997 Assembly of Statistical Reports indicates that 19,026 miles* of roadways fall under the maintenance jurisdiction of Bay Area cities and counties, comprising 91 percent of all road mileage in the region.

Of the remaining roads, the California Department of Transportation (Caltrans) maintains 1,436 miles of state highways, while another 500 miles fall under the jurisdiction of the California Department of Parks and Recreation, U.S. Bureau of Indian Affairs, U.S. Bureau of Land Management, U.S. National Park Service, and the Golden Gate Bridge, Highway and Transportation District (see figure, right).

* All mileage references are centerline miles rather than lane miles.

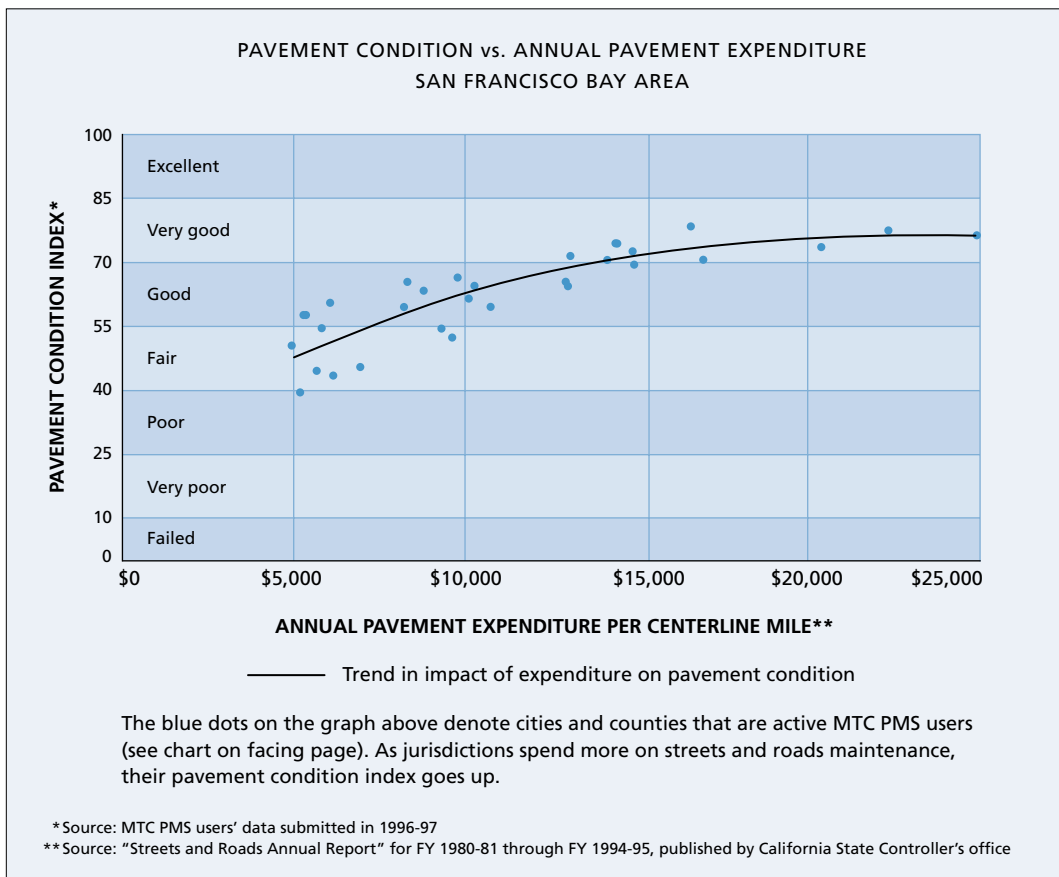
The Funding Picture

INVESTING IN LOCAL STREETS AND ROADS

The 13,900 miles of roads currently maintained by cities and the 5,126 miles for which counties are responsible represent roughly a \$35 billion investment in public funds — the amount it would cost (in 1997 dollars) to reconstruct this road network.

It is clear that preserving this investment by applying judicious preventive maintenance and repair is a less expen-

sive strategy than replacement. However, local expenditures have not kept pace with pavement needs, resulting in a major backlog of deferred maintenance: Averaged over the last 15 years, annual expenditures by Bay Area cities and counties for pavement upkeep and repair amounted to approximately \$13,000 per mile, far less than the nearly \$20,000 estimated by MTC analysts to be necessary to keep roads in good condition.



This gap in expenditures can be traced to historic trends. In the 1970s, county roads and city streets were hit with the double blow of rapidly rising costs — primarily for asphalt — and the declining purchasing power of revenues due to double-digit inflation. The 1980s and 1990s saw both road repair costs and inflation stabilize, but more traffic and heavier trucks, coupled with several extremely heavy rainy seasons, drastically accelerated the rate of pavement deterioration.

WHAT WE'RE SPENDING NOW

Data collected on active MTC PMS users in the Bay Area between FY 1980-81 and FY 1994-95 show that there is a strong correlation between pavement maintenance expenditures and current pavement condition: Jurisdictions that spent an average of \$19,000 per mile per year in the past 15 years on pavement maintenance and rehabilitation now have a pavement condition index of 70 or higher, indicating roadways in “very good” condition (see figure, left, and chart, right).

PAYING FOR PAVEMENT

The Bay Area's local streets and roads revenues are generated from a combination of federal, state, and local sources. Local funds, which make up the lion's share of revenues for cities in the region, come from bond sales, traffic fines and forfeitures, road taxes, sales taxes, street assessment levies, and general funds. All except one of these local revenues are dedicated funding sources: General funds are discretionary, giving cities a choice on whether to use this pot of money for pavement purposes or for other, competing needs.

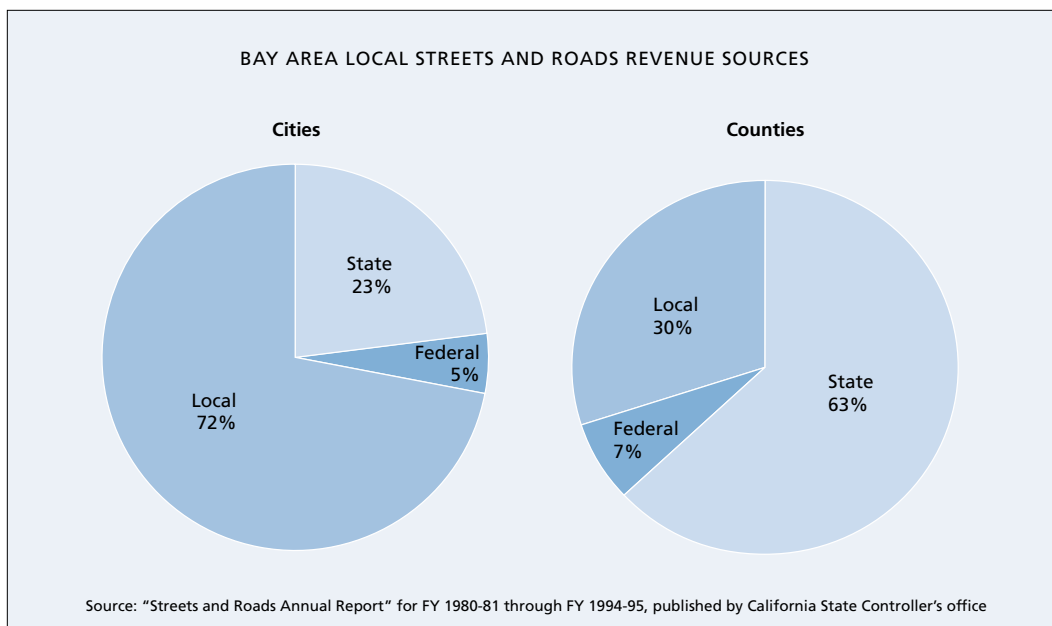
Counties depend largely on state sources — derived primarily from gas tax receipts — to pay for pavement maintenance and repair (see figure, following page).

THE GAPING HOLE IN PAVEMENT

MAINTENANCE FUNDING

MTC estimates that, in the next six years, the pavement maintenance and rehabilitation funding shortfall for the Bay Area will exceed \$1.8 billion. The figure on the

PAVEMENT EXPENDITURE vs. PAVEMENT CONDITION INDEX		
Jurisdiction	Average Pavement Expenditure per Mile FY 1981-95	1996-97 PCI
Foster City	\$ 24,932	77
Mountain View	22,338	78
Fremont	20,376	74
Benicia	16,945	71
Santa Clara	16,581	79
Pleasanton	14,921	70
Alameda County	14,869	73
Livermore	14,416	75
Sunnyvale	14,372	75
Hercules	14,150	71
Danville	13,076	72
Mill Valley	12,990	65
Belmont	12,929	66
Campbell	10,726	60
Santa Clara County	10,266	65
Sausalito	10,079	62
Richmond	9,758	67
Menlo Park	9,597	53
Orinda	9,331	55
Contra Costa County	8,778	64
Napa	8,315	66
Los Gatos	8,209	60
Sonoma County	6,950	46
Calistoga	6,157	44
Berkeley	6,059	61
El Cerrito	5,802	55
Marin County	5,678	45
Los Altos Hills	5,361	58
East Palo Alto	5,316	58
Petaluma	5,181	40
Solano County	4,931	51



facing page provides a summary of the Bay Area funding shortfall by county.

MTC also estimates that, projected over the next 20 years, the shortfall in funding for local streets and roads will total \$5.6 billion, with \$2.3 billion of this amount directly attributable to pavement upkeep and repair.

FILLING THE FUNDING GAP

Congressional passage of the Transportation Equity Act for the 21st Century (TEA 21) in the spring of 1998 was good news for streets and roads. The bill authorized an increase of 40 percent in federal transportation spending over the six-year life of the bill. The California Transportation Commission (CTC) has taken advantage of what amounts to a \$1.7 billion statewide windfall by incorporating these new funds into the 1998 State Transportation Improvement Program (STIP), and directing some of the new dollars toward the repair of damaged streets and roads. In the Bay

Area, 57 percent (or about \$124 million) of the new funds that have been committed to specific projects so far will go to local street and road projects, with approximately one third of this amount directed to rehabilitation projects. The CTC also has streamlined procedures for the STIP process to expedite local road rehabilitation.

MTC has adopted a plan to allocate funds from the major federal programs under its discretion — the Surface Transportation Program (STP) and the Congestion Mitigation and Air Quality Improvement Program (CMAQ) — primarily to benefit "fix-it" projects. It will designate 75 percent of these funds for transportation system rehabilitation and replacement — a total of approximately \$247 million over the next six years for public transit, pavement and other road-related projects. Of this amount, up to \$150 million will likely be programmed for pavement rehabilitation. The remaining 25 percent of the STP and CMAQ

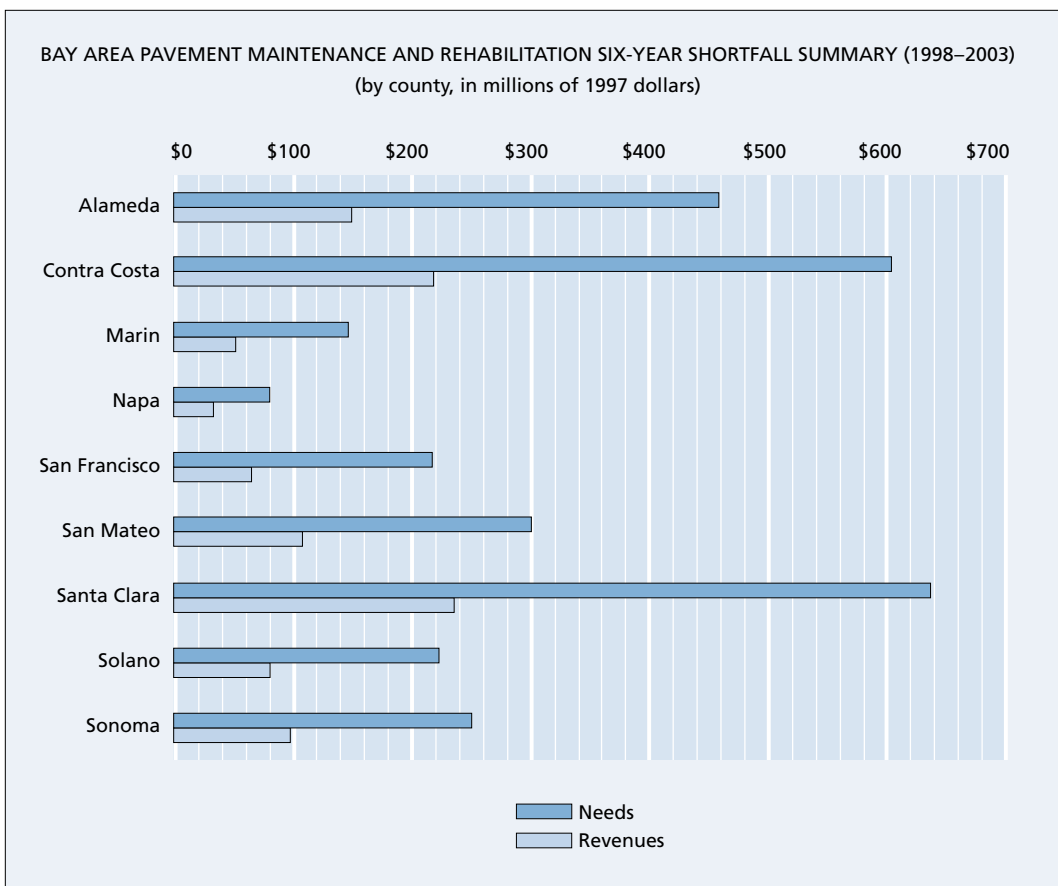
moneys will go for projects that improve the management and safety of the regional transportation network.

POTENTIAL SOURCES OF HELP

County sales tax initiatives and a regional gas tax could provide a needed infusion of funds. Several counties are poised to renew their transportation sales taxes or submit new measures to the voters. State legislation successfully sponsored by MTC in 1997 authorizes MTC to seek voter approval on up to a 10-cent-per-gallon tax on gasoline sold in Bay Area counties to fund a series of transportation improvements. This regional measure

could go before the electorate as early as November 2000. Its passage, however, is by no means assured, since two-thirds of the voters must approve the initiative.

The 1999-2000 session of the state Legislature is considering bonds, general fund contributions, and other mechanisms to increase investment in the transportation infrastructure. MTC is urging the Legislature to consider the needs of local jurisdictions when putting together any such program: Long-term, predictable funding for local road rehabilitation is a must if cities and counties are to make serious strides toward a pothole-free future.



MTC Program Tackles the Pavement Problem

MTC'S PAVEMENT MANAGEMENT SYSTEM (PMS) got its start in 1984 as a pilot program in six Bay Area communities. The full program got under way in 1986 — one of the first in the country to be tailored specifically for cities and counties, rather than just for state highways.

As described earlier, MTC's PMS is a computer-assisted program designed to help local governments take care of their streets in the most cost-effective way possible. It gives jurisdictions a tool for rating their streets' pavement condition, establishing a maintenance and repair

ongoing training and hotline help, and championing the cause of sustaining this valuable public investment to local officials and state legislators. Last year, two of the PMS users — Marion County, Ore., and the Association of Oregon Counties — joined MTC's partnership to further improve the program.

ACTIVIST APPROACH REAPS GREATEST REWARDS

Although there is no standard formula for successfully implementing a pavement management system, interviews with selected Bay Area jurisdictions have revealed several key factors.

- Agencies must develop effective communications with their city council or county board of supervisors. Councils and boards must weigh pavement needs against many other urgent local funding priorities, and information on deferred maintenance and expected changes in pavement condition can be convincing arguments for increased budgets.
- Jurisdictions must dedicate staff time to learning the PMS software in the initial implementation stages. Later, agency personnel must keep current with the program and continuously update their PMS database.
- Cities and counties must commit to periodically re-inspecting their local road

“...The advantage of having a PMS is that it gives you a clear picture of your long-term management strategy and can help justify additional funding from the city council.”

— City of Sausalito engineer

schedule, and estimating how much money should be spent to upgrade their street and road network.

Today, 94 cities and counties in the Bay Area and nearly 200 nationwide are using MTC's program. The partnership effort that launched MTC's PMS has expanded to such an extent that many of the local jurisdictions now use private-sector consultants to help implement the program. MTC continues to support the program by sponsoring user meetings three times a year, as well as providing

BENEFITS OF A PAVEMENT MANAGEMENT SYSTEM

- A pavement management system offers local governments a systematic way of gauging pavement conditions, and provides a set of steps for using the information to identify and schedule the most appropriate treatment.
- It helps local jurisdictions make more efficient use of public funds. In the absence of a pavement management system, available moneys generally are poured into costly reconstruction of a few roadways that are already badly deteriorated, while healthy roadways in need of relatively inexpensive preventive maintenance treatments are ignored.
- PMS allows local governments to predict what conditions would be like at different levels of funding, quantifying the consequences of underfunded road maintenance. It can thus serve as a highly effective advocacy tool for public works directors to secure the budget necessary to keep their pavements in good condition or to bring them up to higher standards.
- On a regional level, as more and more jurisdictions complete their pavement needs analyses using MTC's PMS, MTC is able to document the Bay Area's needs and shortfalls and use the data to build support in the state Legislature for increased funding.
- Jurisdictions that have a PMS program in place will be ready to put any available new moneys to their most cost-effective use immediately.
- Jurisdictions' overall maintenance spending will be reduced once the pavement management system's goal is reached: getting all pavement segments to the condition where preventive maintenance is the primary strategy being applied.

network. As with any computer-based program, the results are only as good as the input data are reliable.

MTC OFFERS ANOTHER HELPING HAND

In late 1998, MTC launched its Pavement Management Technical Assistance Program (P-TAP) to provide the services of pre-qualified consultants to help cities and counties establish and maintain a pavement management system.

Geared toward smaller jurisdictions with limited resources, the program is similar to MTC's Traffic Engineering Technical Assistance Program (TETAP), which was established in 1993 to offer consultant expertise for local governments that do not have the in-house staff needed to properly operate and maintain

“PMS has heightened our awareness of the most economically advantageous way to improve the overall condition of our streets ... [and] has provided me with information to sell my argument to the city council.”

— Los Altos Hills director of public works

their traffic systems, most notably their traffic signal network.

As with the jurisdictions TETAP is designed to help, many cities and counties in the Bay Area have been unable to implement a pavement management system because of the initial cost and staff time required to start up the program. Others have had problems maintaining their systems because of staff turnover

and the resulting lack of experienced personnel.

Funded by federal Surface Transportation Program moneys, MTC's P-TAP has already allocated funding to 27 Bay Area jurisdictions in the first phase of the program, and will focus on improving maintenance strategies for one third of the nearly 19,000-mile local street network. Besides upgrading the pavement condition of Bay Area streets and roads, P-TAP will allow MTC to gather more reliable pavement maintenance data.

“Prior to PMS, we had no reliable way of tracking the condition of our pavement. PMS has helped us to prioritize our needs. It's a great success.”

— City of Pleasanton PMS manager

nance data. This will ensure better estimates of regional needs and shortfalls, which, in turn, will translate into more equitable distribution of existing funds and informed advocacy for new local road revenues.

MTC also recently published a *Guide to the Legal Aspects of Trench Cuts*, to help cities and counties better manage and regulate pavement cuts made by utilities and others for placing telephone, power and cable lines, and water, gas and sewer pipes. By coordinating such excavation with street paving schedules, jurisdictions can minimize the damage to roadways and lengthen the life of pavements.

PMS SUCCESS STORIES

Below are some of the accomplishments of local MTC PMS users:

- In 1985, the Berkeley City Council devoted all of its \$1 million-plus Measure B sales tax funds to improving their street network.
- In 1986, the San Leandro City Council relied on PMS data to dedicate the city's annual half-cent sales tax revenues (approximately \$6 million) to pavement maintenance and rehabilitation.
- In 1988, the Vallejo City Council increased the pavement maintenance and rehabilitation budget from \$900,000 to \$1.4 million. By fiscal year 1991, Vallejo's budget had increased to \$2 million.
- In 1990, PMS data convinced the Benicia City Council to raise its pavement maintenance budget from \$200,000 to \$700,000 for fiscal year 1991.
- In 1993, the Los Altos Hills Town Council doubled its pavement maintenance budget to \$400,000 and increased the budget again the following year.
- In 1997, after a presentation on PMS data, the Danville Town Council increased the town's pavement maintenance budget by \$100,000 a year to \$750,000.
- In response to an existing funding shortfall for pavement maintenance in the city of Fremont, the city council in 1991 committed to increasing the city's pavement maintenance budget by 3 percent per year. By 1997, the overall pavement network condition in Fremont was “very good.”

MORE RESOURCES

For a copy of MTC's *Guide to the Legal Aspects of Trench Cuts*, contact the MTC-ABAG Library by e-mail: library@mtc.ca.gov, fax: **510.464.7852**, or telephone: **510.464.8736**.



For more information about MTC's Pavement Management System (PMS) or its Pavement Management Technical Assistance Program (P-TAP), contact:

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or check out the MTC PMS Web site at www.mtcpms.org.

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